



Rewarding Learning

General Certificate of Secondary Education
2012–2013

Double Award Science: Chemistry

Unit C1

Foundation Tier

[GSD21]



TUESDAY 26 FEBRUARY 2013, MORNING

Centre Number

71

Candidate Number

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TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in question **8(b)**.

A Data Leaflet which includes a Periodic Table of the elements is provided.



For Examiner's use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

Total Marks

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1 Elements can be classified as metals and non-metals.

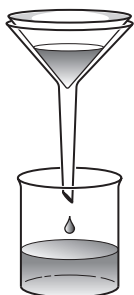
The descriptions below apply to some metals and non-metals.
Draw a line from each description to the correct formula or symbol.

Description	Symbol/formula
Is used for making flares	Ar
Is used in making pencil lead	Mg
Is used for overhead electrical wiring	Fe
Is an unreactive gas found in air	O ₂
Is used to make bridges	C
	Al

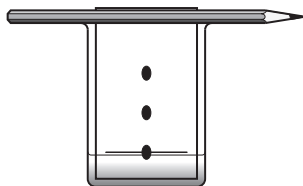
[5]

Examiner Only	
Marks	Remark

2 The diagrams below show different ways of separating mixtures.



A



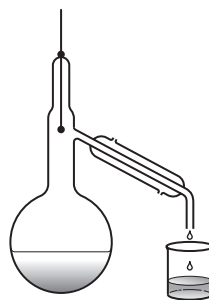
B



C



D



E

(a) Which diagram, **A**, **B**, **C**, **D** or **E**, shows the formation of a distillate?

_____ [1]

(b) (i) In which diagram, **A**, **B**, **C**, **D** or **E**, are immiscible liquids being separated?

_____ [1]

(ii) Name a liquid which is immiscible with water.

_____ [1]

(c) Which diagram, **A**, **B**, **C**, **D** or **E**, shows a filtrate?

_____ [1]

(d) In which two diagrams, **A**, **B**, **C**, **D** or **E**, are changes of state taking place?

_____ and _____ [2]

Examiner Only	
Marks	Remark

3 (a) The picture shows a £5 coin designed for the Olympic Games.

This £5 coin is made of 75% copper and 25% nickel.



© Coin Gallery

(i) What name is given to a substance that is a mixture of two or more different metals?

_____ [1]

(ii) Give **two** reasons why metals are suitable for making coins.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

(b) The table below gives information about different coins.
Use this data to answer the following questions.

Coin	Mass (g)	Thickness (mm)	Composition	% metal
£1	9.5	3.15	copper	70
			zinc	24.5
			nickel	5.5
£2	12.0	2.50	copper	76
			zinc	
			nickel	4
50p	8.9	1.78	copper	75
			nickel	25
20p	5.0	1.70	copper	84
			nickel	16
2p	7.12	1.85	copper	97
			zinc	2.5
			tin	0.5

Source: Royal Mint

(i) What is the percentage composition of zinc in a £2 coin?

_____ % [1]

(ii) Which coin contains the highest percentage of copper?

_____ [1]

(iii) Calculate the difference in thickness between the heaviest and the lightest coin.

You must show your working out.

_____ mm [3]

Examiner Only

Marks Remark

4 The table below shows the atomic numbers and mass numbers for six elements.

element	carbon	nitrogen	oxygen	fluorine	neon	sodium
atomic number	6	7	8	9	10	11
mass number	12	14	16	19	20	23

(a) The electrons in atoms are arranged in shells.

What is the largest number of electrons that can fit into the **first** shell of each of the atoms in the table?

_____ [1]

(b) Which element in the table has 8 protons in the nucleus of its atoms?

_____ [1]

(c) What is the electronic configuration of a sodium atom?

_____ [1]

(d) Explain why the sodium atom has no electrical charge.

_____ [1]

(e) The mass number of fluorine is 19.

What is meant by the term **mass number**?

_____ [1]

(f) Carbon can exist in two different forms with different mass numbers.

What name is given to atoms of the same element with different mass numbers?

_____ [1]

Examiner Only	
Marks	Remark

5 The table below lists some elements arranged in four columns.

A	B	C	D
carbon	lithium	helium	chlorine
silicon	sodium	neon	bromine
lead	potassium	argon	iodine

(a) (i) Which column, **A**, **B**, **C** or **D**, contains halogens?

_____ [1]

(ii) Which element in the table is a liquid at room temperature?

_____ [1]

(b) Which column, **A**, **B**, **C** or **D**, has three elements which all react with water to form solutions with a pH greater than 7?

_____ [1]

(c) Describe fully what you would **observe** when a piece of lithium is added to water.

_____ [4]

(d) Complete the word equation for the reaction of lithium with water.

lithium + water → _____ + _____ [2]

Examiner Only	
Marks	Remark

- 6 (a) Indicators can change colour in acid and alkaline solutions. Indicators can be made from plant material such as red cabbage.

The table below gives information about three different indicators. Use this information to answer the questions that follow.

Substance	Colour of universal indicator paper	Colour of red litmus paper	Colour of red cabbage solution	pH range
hydrochloric acid	red	red	red	1–2
sodium hydroxide	dark blue	blue	yellow	12–14
water	green	red	purple	7
ethanoic acid	orange	red	red	3–6

- (i) Why is red litmus paper **not** a suitable indicator for testing pH?

_____ [1]

- (ii) Explain why red cabbage solution can be described as an indicator.

_____ [2]

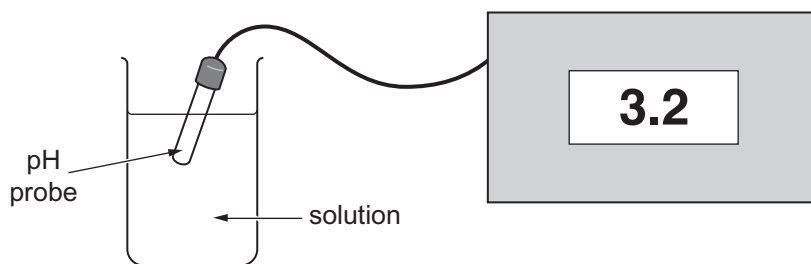
- (iii) Why is universal indicator a better indicator than red cabbage solution for testing acids?

_____ [1]

Examiner Only

Marks Remark

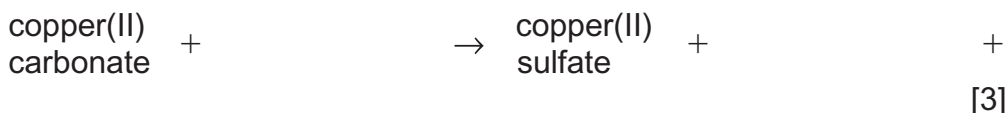
(b) The diagram below shows a way of measuring pH.



Give an advantage of using a pH probe instead of an indicator solution to measure pH.

_____ [1]

(c) When copper(II) carbonate reacts with an acid it forms copper(II) sulfate. Complete the word equation for this reaction.



(d) The colour of copper(II) sulfate crystals changes as they are heated.

The colour and formulae of three types of copper(II) sulfate are given in the table below.

Colour	Formula
blue	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
green	$\text{CuSO}_4 \cdot \text{H}_2\text{O}$
white	CuSO_4

(i) Give the formula of the type of copper(II) sulfate that would be best to test for the presence of water. Explain your answer.

Formula: _____ [1]

Explanation: _____

_____ [2]

(ii) What word is used to describe white copper(II) sulfate?

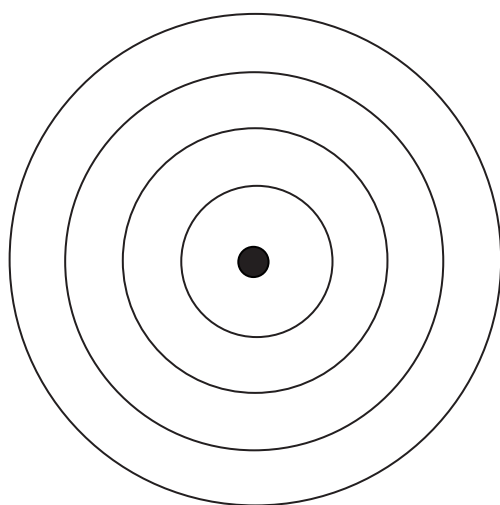
_____ [1]

Examiner Only	
Marks	Remark

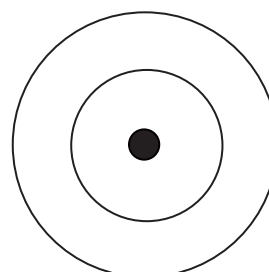
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7 Potassium and fluorine react violently together to form the compound potassium fluoride.

(a) Complete the diagrams below to show the arrangements of **all** the electrons in a potassium atom and a fluorine atom.



potassium atom



fluorine atom

[2]

(b) Describe how a potassium atom becomes an ion and how a fluorine atom becomes an ion. You should state the formula of each ion.

[4]

(c) How are the ions held together in potassium fluoride?

[1]

(d) What is the formula for potassium fluoride?

[1]

Examiner Only	
Marks	Remark

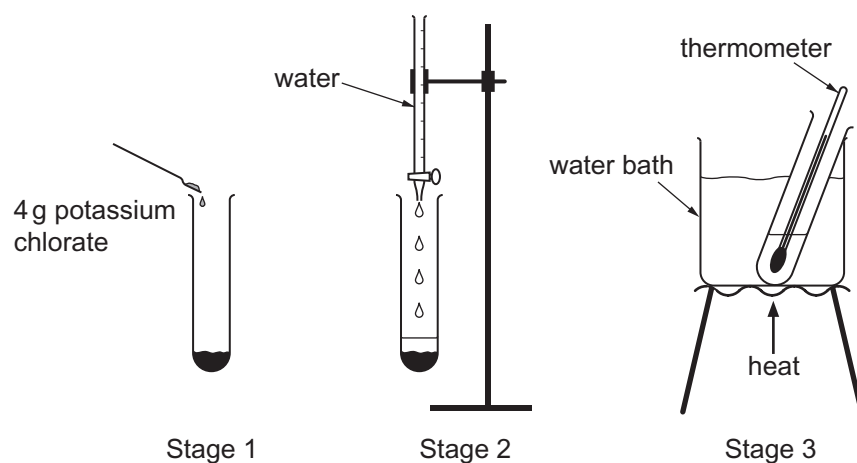
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(Questions continue overleaf)

8 (a) Give an accurate definition of the term solubility.

[4]

In part (b) you will be assessed on your written communication skills including the use of specialist scientific terms.

(b) A student wanted to obtain results to plot a solubility graph for potassium chlorate. The first three stages of the method used are shown below.



Stage 1: 4 g of potassium chlorate are placed in a boiling tube.

Stage 2: 10 cm³ of water are added.

Stage 3: The boiling tube is placed in a water bath and heated until all the potassium chlorate has dissolved. The boiling tube is then removed from the water bath.

Examiner Only

Marks Remark

Describe, in detail, how you would **continue** this experiment in order to obtain a set of results from which you could draw a solubility graph.

[6]

(c) In a similar experiment a student obtained the following results. She used 2g of potassium chlorate each time.

Mass of water (g)	Temperature at which crystals formed (°C)	Solubility in water (g/100g)
4	92	50.0
8	63	25.0
12	48	
16	35	12.5

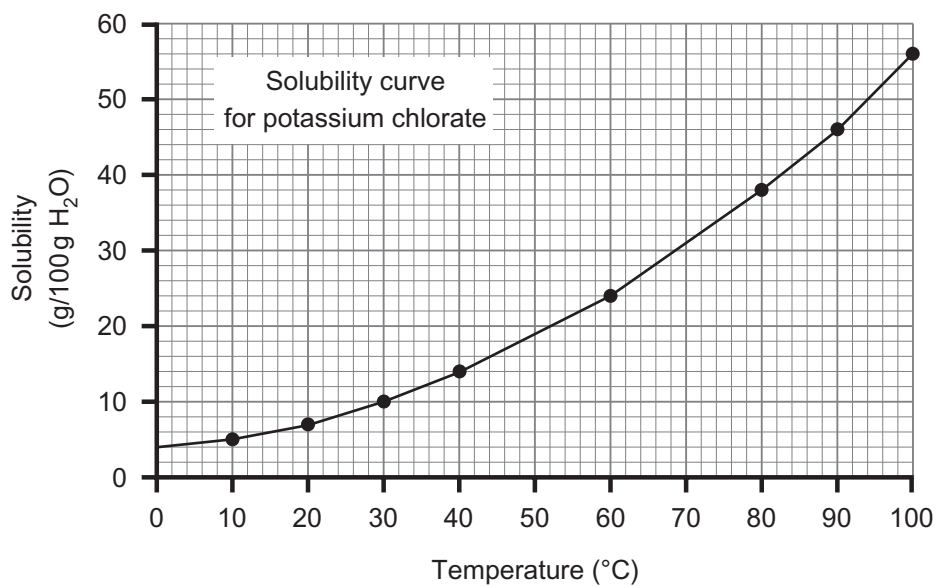
Calculate the solubility which is missing in the table. **You must show your working out.**

_____ g/100g water [3]

Examiner Only	
Marks	Remark

[Turn over

(d) A solubility curve for potassium chlorate is shown below.



(i) Describe the trend in solubility shown by the graph above.

[2]

(ii) What is the solubility of potassium chlorate at 69°C?

[1]

THIS IS THE END OF THE QUESTION PAPER

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Marks	Remark

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